

USER MANUAL



ECObench

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ECObench User Manual

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How to use this manual

The following symbols and icons are used in this user manual:

Symbol/Icon	Description
§	Section of the user manual
*	Mandatory field
	External web link
	Useful tip
	Caution or warning

The text underlined in blue colour is a cross-reference within the user manual itself.
In the soft copy, click it to open the section that is cross-referenced.

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1. Energy Benchmarking

Buildings in India must continuously monitor and improve their performance for the country to transit to an energy efficient economy. It is important to measure this performance against the established benchmarks. The aim is to improve the design, construction, maintenance, and operation of buildings by measuring the energy performance against established benchmarks, and recognize and reward exemplary buildings.

Energy benchmarking is a process of creating a whole building energy consumption profile of a group of buildings characterized by their primary use, construction, physical, geographic, and operating characteristics. The rating is derived by assigning a score to the performance differential between the building under consideration and a benchmarked building in relation to all other buildings in the stock.

2. ECObench Tool

The Ministry of Power, Government of India, set up the Bureau of Energy Efficiency (BEE) under the provisions of the Energy Conservation Act, 2001. As one of its primary objectives, BEE has focused on efforts to reduce energy intensity of the Indian economy by reducing the wasteful use of energy and bridging the power demand-supply gap.

It is with this in mind that BEE, with technical assistance from United States Agency for International Development (USAID) Energy Conservation and Commercialization-Phase III (ECO-III) Project and subsequently the Shakti Sustainable Energy Foundation, embarked on an initiative to evaluate building energy performance based on actual consumption and undertook the energy benchmarking initiative.

Under the guidance of BEE, an online tool called ECObench was conceived and developed to benchmark and rate the energy performance of the commercial buildings. The ECObench Tool gathers inputs from the user to measure the performance of a building against its peers. It displays the benchmarking result in a graphic as well as tabular fashion for the convenience of the user. The tool also generates a report that may be submitted to the authority having jurisdiction to demonstrate a building's performance.

ECObench Tool is an online energy benchmarking and rating tool provided by BEE.

Building owners can use this tool to compare the energy performance of their buildings with that of its peers. In addition, the report that this tool generates may also be used to set targets for the building under consideration.

- ECObench is a web-based tool that is made available to the users over the Internet with minimal software requirements or building science expertise.
- It can be used with minimal learning involved.
- It keeps the information secure and confidential.
- It is available in the public domain (<http://ECObench.eetools.in>) for easy access to the users.

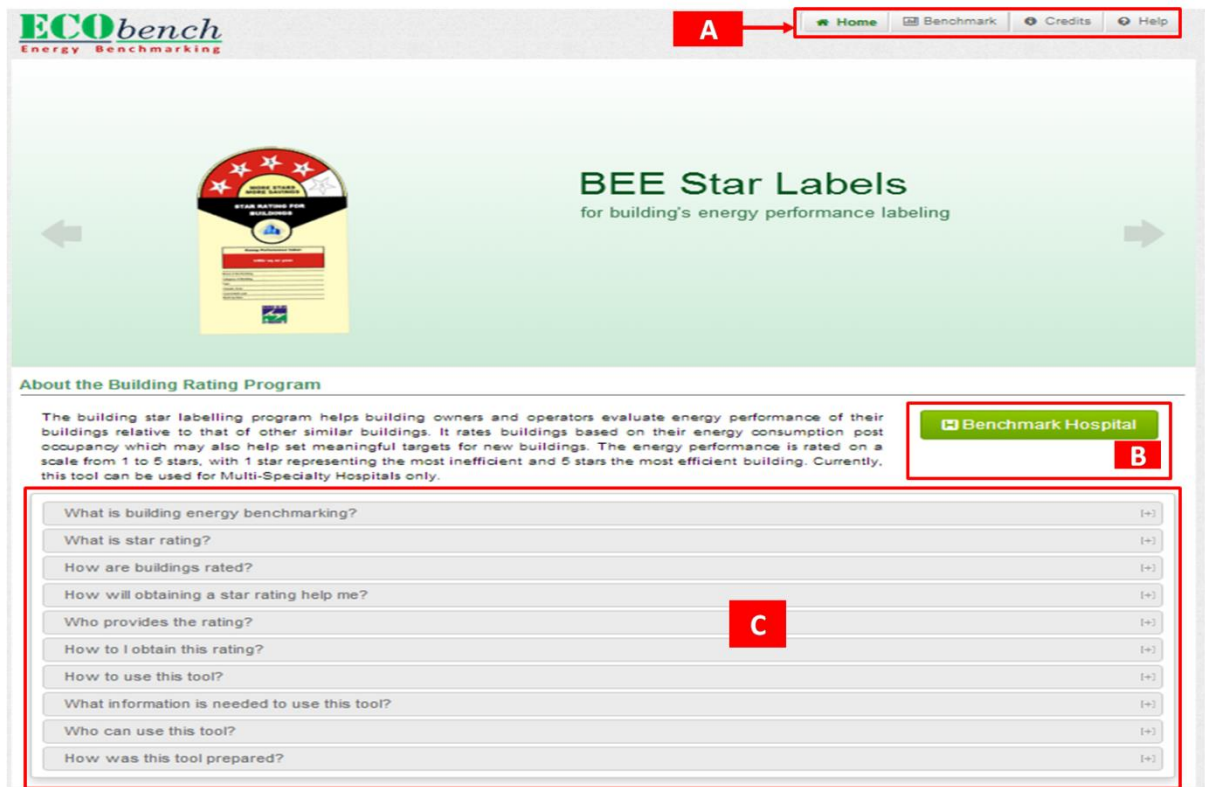
2.1 How to Access

Enter the link <http://ECObench.eetools.in> in the web browser's address bar to access ECObench Tool.

- See Appendix for [Computer Settings](#) to learn about the settings required on a user's computer before using the tool.

3. Homepage

The following illustration highlights the composition of ECObench Tool home page.



A	Navigation Bar (see § 3.1)
B	Direct Link to the benchmarking pages of Hospitals. (see § 4)
C	Concepts related to energy benchmarking and performance rating tool

ECObench Tool is aesthetically designed, keeping in mind the ease of navigation for the end-user. It allows the user to provide inputs that do not need to be sequential. The information can be provided in the sequence preferred by the user. This makes it more intuitive and interactive.

3.1 Navigation Bar

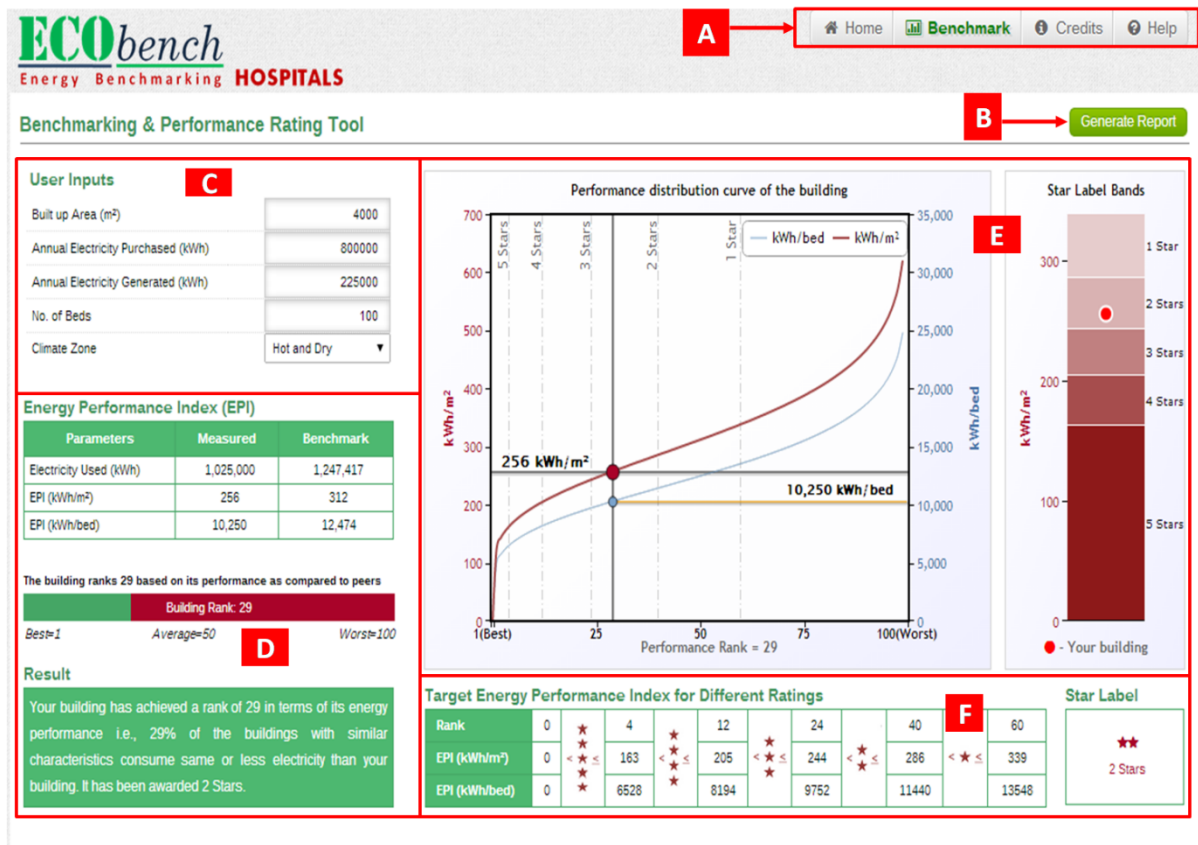
The navigation bar (as shown below) at the top right corner of the screen can be used to access the tool and acquire additional information on it.



Home	Click to view the home page of the tool (see § 3)
Benchmark	Click to select for hospital benchmarking (see § 4)
Credits	Click to view the tool version and credits
Help	Click to view Frequently asked questions (FAQs) and this user manual

4. Benchmarking Tool

Energy benchmarking can be performed using ECObench Tool by clicking the “Benchmark Hospital” button on the homepage of the ECObench Tool. The following illustration highlights the composition of the benchmarking page.



A	Navigation Bar (see § 3.1)
B	Benchmarking Report(see § 4.3)
C	Building related inputs for performing benchmarking (see § 4.1)
D	Benchmarking results: Energy Performance Intensity (EPI) and building ranking and interpretation (see § 4.2)
E	Benchmarking results (charts): Performance distribution curve and histogram. (see § 4.2)
F	Benchmarking results: Star rating and performance bands for hospital buildings (see § 4.2)

4.1 User Inputs

Enter building's information such as its built-up area, electricity consumption details, and climate zone it is located in. It is important to provide correct inputs to get accurate benchmarking results.

User Inputs	
Built up Area (m ²)	4000
Annual Electricity Purchased (kWh)	800000
Annual Electricity Generated (kWh)	225000
No. of Beds	100
Climate Zone	Hot and Dry ▼

4.2 Benchmarking Results

Based on the inputs provided, the benchmarking results (which occupy the rest of the screen) get dynamically updated. The following sub-sections help in interpreting the results.

A. Energy Performance Intensity (EPI)

The Energy Performance Intensity (EPI) is defined as the annual energy consumption measured in kWh per square meter of the built-up area of the building. It is the ratio of the total energy used to the total built-up area and is expressed as kWh/m²/year. Alternatively, it is also defined as the annual energy consumption measured in kWh per bed in a hospital.

Energy Performance Index (EPI)		
Parameters	Measured	Benchmark
Electricity Used (kWh)	1,025,000	1,247,417
EPI (kWh/m ²)	256	312
EPI (kWh/bed)	10,250	12,474

The parameters for the measured building are compared with the benchmark building in the national database. In the above example, the building that is being measured is consuming less energy and therefore performing better than the benchmark building.



The benchmark building is modelled by applying a regression equation on the available data that is representative of energy consumption in buildings in the country.

B. Building Rank

The measured building's performance is ranked in percentile terms vis-à-vis all the other buildings of the same type in the database.

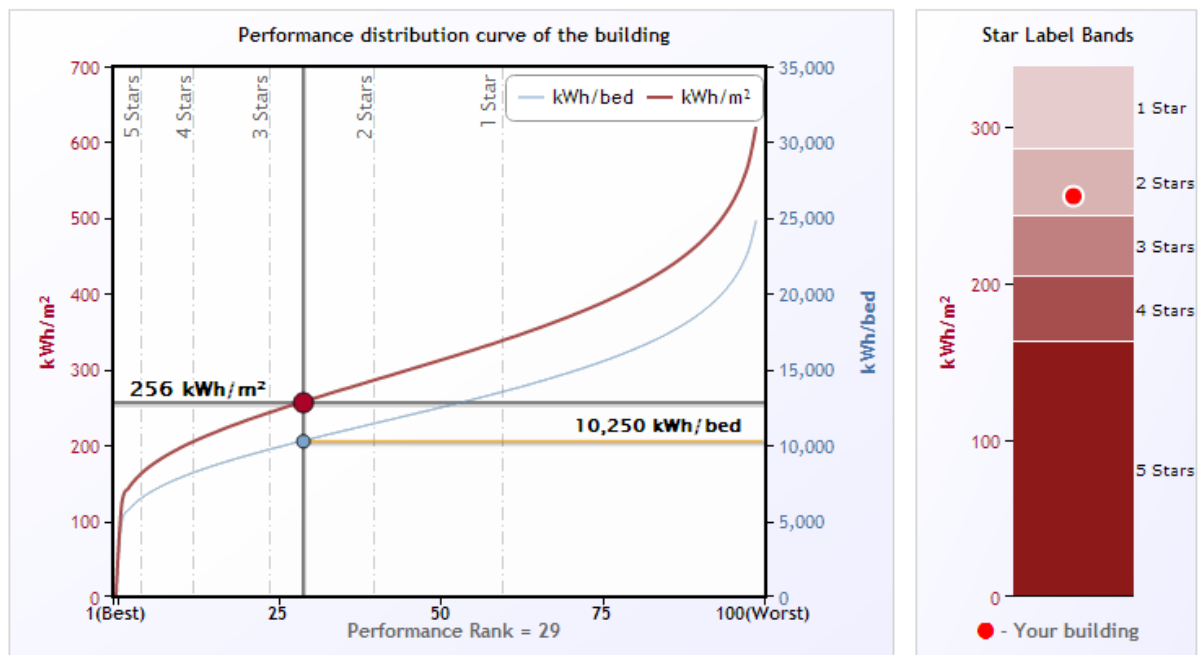


The best performing building is ranked 1 and the worst one is ranked 100.



C. Charts

The EPI and the performance rank are graphically displayed on the line chart. The performance band of the measured building is depicted on the histogram.



The red markers on the two graphs show the building's performance relative to all other buildings.

The red marker on the performance distribution curve (first graph) shows its EPI (kWh/m²/year) measured on the left Y-axis and performance rank measured on the X-axis. The red curve is unique to every building. The enhancements in terms of building systems will enhance the performance and the building will slide up and down its own unique curve. The blue curve and the blue marker show the same information, but normalized by the use intensity rather than the built-up area (the number of beds in the above illustration).

The histogram shows different EPI bands corresponding to different rating levels. The heights of these bands are specific to the building information entered by the user.

D. Star Rating / Performance Band

The measured building is awarded a star rating/performance band based on its energy efficiency (EPI) as compared to that of its peers. The target energy performance for different ratings table provides reference points to achieve a different rating for the same building. Thus, a building with the characteristics entered by the user will have to consume 164 to 205 kWh/m² of energy per year or alternatively, 6529 to 8194 kWh/bed annually to obtain a 4-star rating.

The star ratings are assigned to hospital buildings depending upon their EPI.

Target Energy Performance Index for Different Ratings											Star Label	
Rank	0	★★★	4	★★	12	★★★	24	★★★	40	★★★	60	★★★ 2 Stars
EPI (kWh/m²)	0	< ★★★ ≤	163	< ★★ ≤	205	< ★★★ ≤	244	< ★★ ≤	286	< ★★★ ≤	339	
EPI (kWh/bed)	0	★★★	6528	★★★	8194	★★★	9752	★★★	11440	★★★	13548	

4.3 Energy Benchmarking Report

The energy benchmarking report can be used for analysis and improvement purposes.



See [§6](#) to understand the settings required on the computer to access the benchmarking report.

Following are the steps to generate an energy benchmarking report:

- Access the tool by clicking the “Benchmark” button located at the top right corner of the screen
- Enter the relevant information for your building. Once the information is entered, the tool will automatically rank your building.
- Click on the “**Generate Report**” button located at the top right corner of the screen. A modal pop up box (as shown below) will appear.

Building Details

Building Name

Building Address

State

City

Pin Code

One year data period ending in

- Enter the information in pop-up box appropriately and click on “Create”. The report will be downloaded automatically.

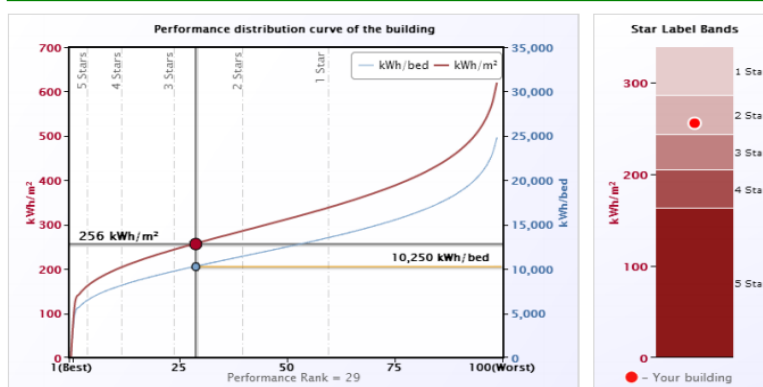
Benchmarking & Performance Based Labeling Report

Building Name **Bee** Date of Reporting **17 July 2014**
 Address **XYZ** One year data period ending on **1 July 2014**
 Delhi, Delhi
 PIN Code **123456** Rating Valid up to **1 July 2019**

1. Input Summary

Building Detail	Annual Energy Use Summary
Type Hospital	Purchased from Utility 800,000 kWh
Sub-type Multi-Speciality	Generated from DG/GG 225,000 kWh
Built up Area (m ²) 4,000	Total Energy Consumed 1,025,000 kWh
Climate Zone Hot and Dry	
No. of Beds 100	

2. Comparison with National Benchmark



The following is the composition of the energy benchmarking report:

Report Section	Details Captured
Input Summary	Summary of the inputs provided by the user
Comparison with national benchmark	Energy comparison with the national benchmark building available in the national database
Evaluation	EPI details of the building vis-à-vis the buildings in the national database
Targets	Various targets for the star ratings assigned to the buildings
Remarks	Remarks related to the building energy benchmarking exercise
Certification	Certification provided by the Authority Having Jurisdiction
Disclaimer	Disclaimer related to the building energy benchmarking result

5. Glossary of Acronyms

Term	Description
BEE	Bureau of Energy Efficiency
EPI	Energy Performance Intensity
kWh	Kilowatt Hour
m ²	Square Meter
PDF	Portable Document Format

6. Appendix: Computer Settings

ECObench Tool is a web based application. No special software is required to be installed on the computer.

Following are the system settings and recommendations for using the tool:

- ECObench Tool works with the latest version of all the popular web browsers.
- The HTML5 supported browser should be installed on the computer.



For example download the latest Google Chrome Browser from <https://www.google.com/intl/en/chrome/browser/> (consult the System Administrator for assistance, if required).

- No special plug-in or software is required to use the tool.
- JavaScript must be enabled in the web browser.
- The tool is best viewed in 1024 x 768 or higher screen resolution.
- PDF viewer must be installed on the computer to view the reports. e.g. Adobe® Reader® can be downloaded free of cost from <http://get.adobe.com/reader>
- Consult the System Administrator for assistance, if required

An initiative supported by



ABOUT SHAKTI SUSTAINABLE ENERGY FOUNDATION

Shakti Sustainable Energy Foundation works to strengthen the energy security of India by aiding the design and implementation of policies that support energy efficiency and renewable energy.

